

Campus Resource Conservation Program

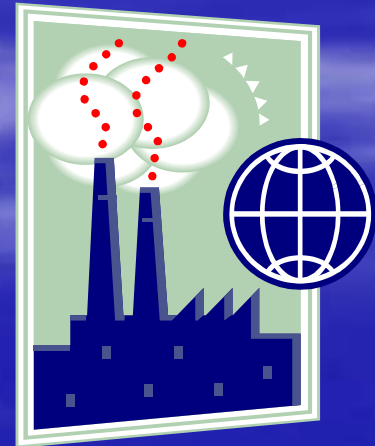
Progress Report
Since September 2002

Organization Structure

- September 2002 - Full-time energy conservation officer appointed
- Steering Committee formed for Campus Resource Conservation Committee (CRCC)
- October 2002, energy conservation hotline established
 - (303) 735-6202 and e-mail: energyconservationhotline@fm.colorado.edu
 - good source of suggestions on areas of water and energy waste
- February 2003, campus energy conservation web site implemented. Conservation news, updates, tips and energy and water usage.
<http://www.colorado.edu/conservation>

Goals and Objectives

- Vice Chancellor Tabolt's goal for the campus is to reduce energy consumption by 5% per-square-foot. This is very significant given past decade of annual consumption increase by 5%. Benefits will be derived from dollars savings and the reduction of carbon emissions for the CU-Boulder campus.



Why Micro Turbine

- Highly Efficient Energy Production, Combined Heat and Power (CHP)
- Lower Cost of Energy
- Smaller Foot Print
- Lowering Green House Gas (GHG) Emission
- Provide an opportunity for students to learn about distributed generation, micro turbine technology and Combined Heat and Power (CHP).

Source of Micro Turbine

- Micro Turbine has been donated by Governor's Office of Energy Management and Conservation.
- University of Colorado at Boulder has agreed to select and install this unit in an optimum application.
- CU will operate and provide operational data for a period of two years.
- Open access & educational opportunities for students.

Micro Turbine Specification

- 30 Kilowatt (30kW) Capstone Micro turbine.
 - Micro Gen Heat Exchanger and Gas Compressor
- C30 Capstone Micro turbine
 - Fuel, Natural Gas 52-55 psig
 - Power 30kW \pm 1%
 - Emissions (NO_x) <9 PPM
 - Exhaust Flow 600 cfm
 - Total Exhaust Energy 310,000 Btu/hr
 - Weight 1052 lb
 - Dimensions 74.8"x 28.1"x 52.9" (About the size of a large refrigerator)
 - Sound 65dBa at 33ft
 - System Efficiencies 70-80%
- Can serve as Primary, Emergency backup, Standby Power, add capacity or reduce grid consumption.

How Does Micro Turbine Work

- Like a jet engine, the micro turbine mixes fuel with air to create combustion. This combustion turns a magnet generator, compressor and turbine wheels on a single shaft with Air Bearing Design at high speed (90,000+ RPM) with no need for additional lubrications, oil, or coolants.
- The micro turbine exhaust travels through a heat exchanger that is used to produce useful heat.

Micro Turbine Application

- CU Student Recreation Center Swimming Pools
- Micro turbine will power swimming pools pumps and heat pool water (combined heat and power, CHP).
- Business case indicates approximately \$16,000 savings annually for Recreation Center (cost of steam & electricity).

Implementation

- Micro turbine was received at CU Boulder after complete update and test by factory.
- Mechanical and electrical contractors have been selected.
- Consulting engineer was added to the team to design controls & size of water flow through heat exchanger,
- Capstone application engineer are supporting our team by answering specific questions.
- Natural gas piping has been installed.
- Expecting to complete installation & commissioning this summer.



January, 2004





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